

WHAT IS CLAIMED IS:

1                          102 5,638,165  
2                          An insulated wall panel, comprising:  
3                          a rigid foam sheet with first and second planar sides and having first  
4                          and second grooves extending substantially the full length of the sheet in a  
5                          substantially parallel orientation in the first side of the sheet;  
6                          a first reinforcing strip having a length, a top and a bottom with the  
7                          bottom being disposed in the first groove and the top facing outwardly away from the  
8                          first groove, wherein the first strip extends substantially the full length of the sheet;  
9                          a second reinforcing strip having a length, a top and a bottom with the  
10                         bottom being disposed in the second groove and the top facing outwardly away from  
11                         the second groove, wherein the second strip extends substantially the full length of the  
sheet;  
12                         a first thin reinforcing layer bonded to the first planar side of the sheet,  
13                         and extending across the top of the first and second grooves and substantially  
14                         covering the entire first planar side of the sheet; and  
15                         a second thin reinforcing layer bonded to the second planar side of the  
16                         sheet and extending across substantially an entire surface of second planar side.

1                          1. The insulated wall panel of claim 1, wherein the bottoms of the first  
2                         and second strips each have two downwardly extending flanges that are oriented  
3                         substantially perpendicular to the first planar side.

1                          2. The insulated wall panel of claim 2 wherein the top of the first and  
2                         second reinforcing strips are mechanically textured over the length of the first and  
3                         second strips to provide an improved gripping surface for drills and self tapping  
4                         screws.

1                          3. The insulated wall panel of claim 2 wherein the top of the first and  
2                         second reinforcing strips have a plurality of holes spaced apart at predetermined  
3                         intervals along the length of the first and second reinforcing strips.

1                          4. The insulated wall panel of claim 2, wherein the top of the first and  
2                         second reinforcing strips have a plurality of slots spaced apart at predetermined  
3                         intervals along the length of the first and second reinforcing strips.

1                          5. The insulated wall panel of claim 2, wherein the top of the first and  
2                         second reinforcing strips have a plurality of slots spaced apart at predetermined  
3                         intervals along the length of the first and second reinforcing strips.

- 107 does it say vapor but is not carrying heat.*
- 1       6. The insulated wall panel of claim 2, wherein the first reinforcing layer  
2 is bonded to the rigid foam sheet to enclose the first and second reinforcing strips and  
3 define a first vapor barrier across substantially the entire first side of the sheet.  
*7. The insulated wall panel of claim 6, wherein the second reinforcing*  
1       2 layer is bonded to the rigid foam sheet to define a second vapor barrier across  
3 substantially the entire second side of the sheet.  
*8. The insulated wall panel of claim 7, wherein the first and second*  
1       2 reinforcing layers have a tensile strength at least 100 times as great as the tensile  
3 strength of the foam sheet.
- 9. The insulated wall panel of claim 8, wherein a first portion of the first*  
1       2 reinforcing layer extending across the top of the first reinforcing strip is placed in  
3 tension when the panel is bent away from the first reinforcing strip before the foam  
4 sheet will fracture at the first groove.
- 10. The insulated wall panel of claim 8, wherein a second portion of the*  
1       2 first reinforcing layer extending across the top of the second reinforcing strip is placed  
3 in tension when the panel is bent away from the second reinforcing strip before the  
4 foam sheet will fracture at the second groove.
- 11. A method of manufacturing an insulated wall panel, comprising the*  
1       2 steps of:  
3              creating a rigid foam block having first and second opposing sides;  
4              cutting the foam block to form a plurality of stacked individual foam  
5 sheets having first and second sides and a plurality of parallel recesses in the first  
6 side;  
7              inserting a reinforcing strip having a top and a bottom into each of the  
8 plurality of recesses in each of the plurality of sheets;  
9              covering the tops of each of the reinforcing strips with a first thin  
10 reinforcing layer;  
11              bonding the first reinforcing layer to the first side of each of the foam  
12 sheets.

1           12. The method of claim 11, further comprising the steps of:  
2           bonding a second reinforcing layer to the second side of each of the  
3           foam sheets.

~~13~~ The method of claim 12, wherein the step of cutting the foam block includes the steps of:

3 drawing a hotwire frame of substantially equally spaced parallel hot  
4 wires through the block from the first side to the second opposing side of the block;  
5 simultaneously forming each of the plurality of grooves in the block  
6 with each of the hot wires in the of the hotwire frame; and  
7 completing a path through the block by substantially simultaneously  
8 separating the block into the plurality of sheets.

1        14. The method of claim 11, wherein the step of bonding the first  
2 reinforcing layer includes at least one of the following steps:  
3                (a) applying adhesive to the first side of each of the plurality of sheets  
4 and subsequently rolling the first reinforcing layer onto the first side;  
5                (b) applying adhesive to the first reinforcing layer and subsequently  
6 rolling the first reinforcing layer onto the first sides of each of the foam sheets; and  
7                (c) rolling the first reinforcing layer onto the first sides of the foam  
8 sheets and subsequently heating the first reinforcing layer to form a thermal bond  
9 between the first sides of the foam sheets and the first layer.

1 15. The method of claim 11, further comprising the steps of:  
2 orienting the foam sheet with respect to a means for trimming each  
3 sheet such that there is a predetermined distance between the means for trimming and  
4 the reinforcing strips, and trimming an edge of the foam sheet.

1           16. A method of manufacturing an insulated foam panel, comprising the  
2 steps of:  
3                 forming a liquid matrix of expandable foam precursor;  
4                 channeling the liquid matrix out through a nozzle;  
5                 capturing the liquid matrix between two parallel and advancing thin  
6 sheets of reinforcing material;  
7                 inserting a plurality of continuous webs of reinforcing strip between  
8 the two sheets of reinforcing material;  
9                 maintaining the sheets in a substantially parallel, spaced-apart  
10 orientation as they advance over a distance sufficient to permit the liquid matrix to  
11 expand, fill substantially an entire void between the two sheets and harden in the form  
12 of a continuously moving ribbon of insulated paneling; and  
13                 repeatedly and successively cutting the moving ribbon into a plurality  
14 of individual insulating panels having a cut edge substantially perpendicular to the  
15 direction of advancement.

1           17. The method of claim 16, further comprising the steps of:  
2                 unrolling a plurality of ribbons of reinforcing material at substantially  
3 the same linear rate as the first and second sheets advance; and  
4                 roll-forming the plurality of unrolled ribbons into the plurality of  
5 continuous webs of reinforcing strip.

1           18. The method of claim 17, further comprising the step of:  
2                 continuously trimming lateral opposed edges of the ribbon of insulated  
3 paneling as the ribbon advances and prior to step of repeatedly and successively  
4 cutting.

1           19. The method of claim 17, wherein the step of inserting includes the  
2 steps of:  
3                 spacing the plurality of continuous webs of reinforcing strips a  
4 predetermined first distance apart.

1           20. The method of claim 17, wherein the steps of maintaining the sheets  
2 includes the step of:  
3                 simultaneously maintaining the plurality of continuous webs of  
4 reinforcing strips at the predetermined first distance apart.

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